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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/821,729 | 04/09/2004 | Anders Landin | 5681-13301 | 1516 |

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| EXAMINER |
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VERDERAMO III, RALPH

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| ART UNIT | PAPER NUMBER |
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2186

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 04/11/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/821,729 | LANDIN ET AL. | |
| | Examiner | Art Unit | |
| | Ralph A. Verderamo III | 2186 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>7/11/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 36 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 36 as written depends from claim 37 which is improper.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Pb. 3. *Claims 1-9 and 12-42*
~~Claim~~ rejected under 35 U.S.C. 102(b) as being anticipated by Hunter et al.

US Patent No. 5394555 (herein after referred to as Hunter).

Regarding claims 1, 16 and 28, Hunter discloses a system, comprising: an inter-node network (Internode ECU bus, column 4, line 18 and internode ECU bus 11 of FIG. 2); and a plurality of nodes (2 nodes represented in FIG. 2 also described in column 4, lines 10 – 12) coupled by the inter-node network, wherein each of the plurality of nodes includes a plurality of active devices (2 CPUs represented in FIG. 2 also described in column 4, lines 10 – 12), an interface configured to send and receive coherency messages on the inter-node network (ECU 10 of FIG. 2 and column 4, lines 13 – 18), and an address network

coupling the plurality of active devices to the interface (node local bus 4 of FIG. 2 and column 4, line 14); wherein an active device included in a node of the plurality of nodes is configured to initiate a transaction involving a coherency unit by sending either a first type of address packet or a second type of address packet on the address network dependent on whether the active device is included in a multi-node system (Since commands snooped from ECU bus 11, which originated from other nodes, must be translated for the local node the commands (address packets) used globally and locally must be different and used based on where the command is going (column 4, lines 21 – 25)).

Regarding claims 2, 17, and 29, Hunter discloses the system of claim 1 (see above), wherein the active device is configured to send the first type of address packet if the active device is included in a multi-node system, and wherein each active device included in the node having access to or ownership of the coherency unit is configured to ignore the first type of address packet (If a CPU wishes to obtain an exclusive copy of a shared cache-line it places a suitable command on its node-local bus (column 6, lines 21 – 26). In the further described steps the other CPUs included in the local node do not take any action (column 6, lines 27 – 45)); wherein each active device included in the node having access to or ownership of the coherency unit is configured to transition an access right to or an ownership responsibility for the coherency unit in response to the second type of address packet (If a node contains the cache-line in a modified state (ownership) it is siphoned to the requesting node and invalidated

in the originating node. The cache line is then owned exclusively and can be updated (column 4, lines 33 – 48)).

Regarding claims 3, 18, and 30, Hunter discloses the system of claim 1 (see above), wherein the first type of address packet is a remote write back address packet, wherein the active device is configured to send the remote write back address packet if the active device is included in a multi-node system and if the coherency unit is not mapped by any memory subsystem included in the node (A modified shared page that has not been referenced for some time can be evicted by signaling its home node to write it to disk (column 7, lines 21 – 24)).

Regarding claims 4, 19, and 31, Hunter discloses the system of claim 3 (see above), wherein an interface included in the node is configured to send a coherency message via the inter-node network to a home node for the coherency unit in response to receiving the remote write back address packet, and wherein each active device included in the node is configured to ignore the remote write back address packet (The coherency states of cache-lines in remote nodes may be left intact, which one would conclude to mean that they are ignoring that particular command (column 7, lines 28 – 29)).

Regarding claims 5 and 32, Hunter discloses the system of claim 4 (see above), wherein a home interface in the home node is configured to lock the coherency unit in response to the coherency message and to responsively send an additional coherency message requesting initiation of a proxy read-to-own-modified subtransaction to the interface in the node (When an exclusive copy of

a cache-line is required a RTW or "read with intent to write" (read to own modified) command is sent (column 6, lines 21 – 52)).

Regarding claims 6, 20, and 33, Hunter discloses the system of claim 5 (see above), wherein in response to receiving the additional coherency message, the interface in the node is configured to send a proxy read-to-own-modified address packet on the address network (column 6, lines 21 – 52).

Regarding claims 7, 21, and 34, Hunter discloses the system of claim 6 (see above), wherein each active device included in the node having an access right to the coherency unit and not having an ownership responsibility for the coherency unit is configured to invalidate the access right in response to the proxy read-to-own modified address packet (INV command is sent to other nodes, which cause them to set their states to invalid (column 6, lines 31 – 40 as well as lines 41 – 45).

Regarding claims 8, 22, and 35, Hunter discloses the system of claim 6 (see above), wherein the active device is configured to transition an ownership responsibility for the coherency unit upon receipt of the proxy read-to-own modified address packet and to responsively send a data packet corresponding to the coherency unit to the interface (A remote node that contains the line in exclusive or modified state will transmit the cache line over the inter-node bus to the requestor (column 6, lines 31 – 40). As explained in column 6, lines 21 – 26, this step is part of a request for an exclusive copy (ownership) which sends an RTW or "read with intent to write" command (read to own modified)).

Regarding claims 9, 23, and 36, Hunter discloses the system of claim 8 (see above), wherein the active device is configured to transition an access right corresponding to the coherency unit upon sending the data packet (A remote node that contains the line in exclusive or modified state will transmit the cache line over the inter-node bus to the requestor (column 6, lines 31 – 40). As explained in column 6, lines 21 – 26, this step is part of a request for an exclusive copy (ownership) which sends an RTW or “read with intent to write” command (read to own modified)).

Regarding claims 12, 26, and 39, Hunter discloses the system of claim 1 (see above), wherein the first type of address packet is a remote write stream packet, wherein the active device is configured to send the first type of address packet if the active device is included in a multi-node system and to send the second type of address packet if the active device is included in a single node system (From the specification a remote write stream command retrieves a copy of data while allowing the owning node to keep its copy. This is similar to a shared cache line state (column 6, line 14)).

Regarding claims 13, 27, and 40, Hunter discloses the system of claim 12 (see above), wherein an interface included in the node is configured to respond to the first type of address packet by sending a coherency message via the inter-node network to a home node for the coherency unit, and wherein active devices and memory subsystems included in the node are configured to ignore the first type of address packet (The coherency states of cache-lines in remote nodes

may be left intact, which one would conclude to mean that they are ignoring that particular command (column 7, lines 28 – 29)).

Regarding claims 14 and 41, Hunter discloses the system of claim 13 (see above), wherein in response to the coherency message, a home interface included in the home node is configured to lock the coherency unit and to responsively send an invalidating coherency message to one or more ones of the plurality of nodes and to send a write stream coherency message to the interface in the node (When an exclusive copy of a cache-line is required a RTW or “read with intent to write” (read to own modified) command is sent (column 6, lines 21 – 52). INV command is sent to other nodes, which cause them to set their states to invalid (column 6, lines 31 – 40 as well as lines 41 – 45)).

Regarding claims 15 and 42, Hunter discloses the system of claim 14 (see above), wherein the interface in the node is configured to send a pull request data packet to the active device in response to receiving acknowledgment coherency messages from each of the one or more ones of the plurality of nodes that received the invalidating coherency message; wherein in response to the pull request data packet, the active device is configured to send an additional data packet containing a copy of the coherency unit to the interface (A remote node that contains the line in exclusive or modified state will transmit the cache line over the inter-node bus to the requestor (column 6, lines 31 – 40)).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter in view of Farmwald et al. US Patent No. 5606717' (herein after referred to as Farmwald).

Regarding claim 10, Hunter discloses the owner of a node providing data about a coherency unit (column 6, lines 31 – 40). Hunter does not disclose the use of a NACK data packet.

Farmwald, which describes a bus interface for receiving information in packets, describes the use of a NACK (column 13, line 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include the use of a NACK packet as described in Farmwald with

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the system of Hunter because NACKs are well known and conventional in the art.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter in view of Baxter et al. US Patent No. 5887146 (herein after referred to as Baxter) and Martin et al. "Bandwidth Adaptive Snooping" (herein after referred to as Martin).

Regarding claim 11, Hunter discloses the system of claim 1 (see above) but does not disclose the use of a mode register.

Martin, which describes snoop protocols, discloses the use of a counter to determine how many nodes are being used in the system (Martin Page 2).

Baxter, which describes a multi-node system, discloses the use of a mode register (Baxter, column 47, line 66).

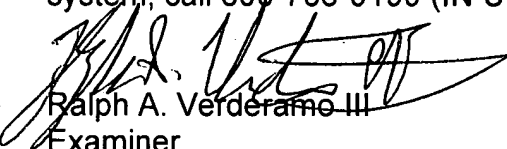
It would have been obvious to one of ordinary skill in the art at the time of the invention to include a mode register to determine if the node is in a multi-node system because it is important to know the network utilization (Martin Page 2) and mode registers are well known and conventional in the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ralph A. Verderamo III whose telephone number is (571) 270-1174. The examiner can normally be reached on M-Th 7:30 - 5, every other Friday 7:30-4.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Ralph A. Verderamo III
Examiner
Art Unit 2186

rv
April 2, 2007



PIERRE BATAILLE
PRIMARY EXAMINER
4/2/07